

MiniDV Tape Data Migration with Open-source Tools
User Documentation

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New York University - Moving Image Archiving & Preservation

Instructors Kelly Haydon & Ben Turkus

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github.com/amiaopensource/vrecord

Everyone at mediaarea.net

DVRescue team: Dave Rice, Libby Hopfauf, Ashley Blewer, and Andrew Weaver
github.com/mipops/dvrescue

RiceCapades
dericed.com

Moving Image Preservation of Puget Sound
mipops.org

DVRescue is still currently being developed with the help from a grant from the National Endowment of Humanities (NEH). Please support and follow their progress here: mipops.tumblr.com

AMIA 2020 virtual presentation can be found here: youtu.be/YGPIqJ4_ssI

April Griess compiled this document during the COVID-19 pandemic. April Griess opted to receive fulling remote instruction for the entirety of the fall 2020 semester. David I. Griess purchased all hardware referenced in this document with limited resources. Therefore, the hardware used is not necessarily a recommendation but rather what was available. This is a living document that will inevitably require revisions & updates as needed.

All credit and licenses for these tools are to be respected. This document is intended to serve as user documentation and has no intention of removing prior credit where credit is due.

Open-source software, documentation, and collaboration are imperative to continue the work of audiovisual archiving & preservation.

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Buying Guide / Manufacturer Resources

Hardware & Accessories

Tape Playback Device - MiniDV Camcorder *

Sony DCR-PC100 MiniDV Camcorder

- Manual
<https://www.sony.com/electronics/support/camcorders-tapecamcorders/dcr-pc100/manuals>
- Purchase Source
<https://www.adorama.com/l/Used/Video>

Cable - IEEE-1394 FireWire referred to as i.LINK by SONY

Tripp Lite F019-006 6 ft. IEEE-1394b FireWire
800 Gold Hi-Speed 9pin/4pin Cable Male to Male

- Purchase Source
<https://www.newegg.com/black-tripp-lite-6-ft-others/p/N82E16812120372>

Computer - MacOS

Refurbished 13.3-inch MacBook Pro 2.9GHz Dual-core Intel i7

- Port Identification
<https://support.apple.com/en-us/HT201736>
- Firewire Support for Mac
<https://web.archive.org/web/20200229170245/support.apple.com/guide/mac-help/use-firewire-devices-hwfw001/mac>
- Purchase Source
<https://www.apple.com/shop/refurbished/mac>

* This user documentation utilizes a MiniDV camcorder in good working condition for tape playback and data migration. A stand-alone DV deck is a recommendation as they are sturdier, easier to clean, and service. A stand-alone DV deck is ideal for a high rate of tape playback. If you have many tapes in need of data migration, a stand-alone DV is applicable.

Software Management & Software

- Homebrew
open-source package management for macOS.

<https://brew.sh>
Install via terminal
- vrecord
“open-source software for capturing a video signal and turning it into a digital file.”

<https://github.com/amiaopensource/vrecord>
Install with Homebrew via Terminal
- DV Analyzer
“a technical quality control and reporting tool that examines DV streams in order to report errors in the tape-to-file transfer process, such as video error concealment information, invalid audio samples, timecode inconsistency, inconsistent use of arbitrary bits in video DIF blocks, and DIF structural problems. DV Analyzer also reports on patterns within DV streams such as changes in DV time code, changes in recording date and time markers, first and last frame markers within individual recordings, and more. Initially funded, designed and led by AVPreserve; developed by MediaArea. MediaArea was involved in the development and provides binaries for all platforms.”

<https://mediaarea.net/DVAnalyzer>

GUI or CLI https://mediaarea.net/DVAnalyzer/Download/Mac_OS
Install via direct download
- DVRescue
“Archivist-made software that supports data migration from DV tapes into digital files suitable for long-term preservation.”
<https://github.com/mipops/dvrescue>

<https://mediaarea.net/DVRescue>
Install via direct download or with Homebrew via Terminal

Daily Builds

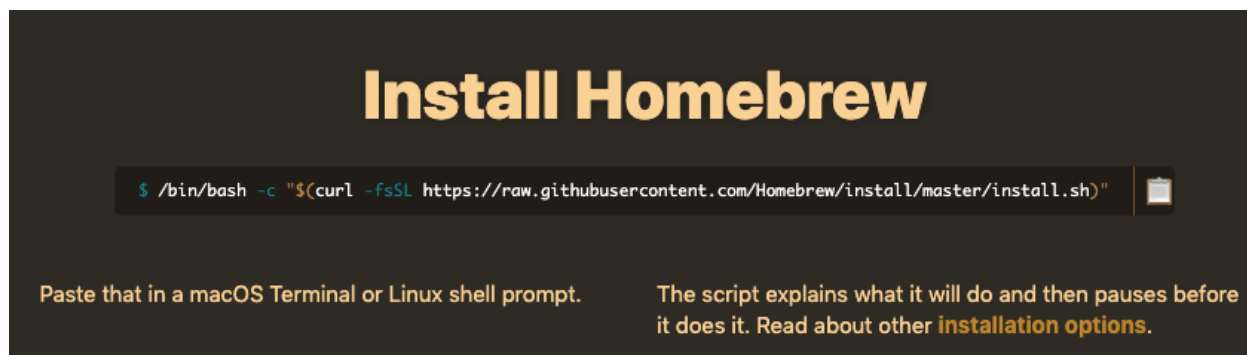
- For the most recent and up to date builds please refer here:
<https://mediaarea.net/download/snapshots/binary/>

This can be useful if you are running into errors or want the latest version.

Step by Step Guide

1. Install Homebrew via Terminal

Go to <https://brew.sh> for script as seen in image below



2. Install vrecord via Terminal

Go to <https://github.com/amiaopensource/vrecord>

Installing vrecord

macOS

If you use macOS, you can easily install vrecord using a package manager called Homebrew. To install Homebrew, follow [these instructions](#).

To install vrecord, run the following two commands in a [Terminal window](#):

```
brew tap amiaopensource/amiaos
brew install vrecord
```

(The first taps the homebrew recipes of the amiaopensource account; the second installs vrecord and the other programs that it requires.)

Once vrecord has been successfully installed, you can update it to the latest release by first running:

```
brew update
```

(This updates all of your Homebrew recipes to the latest versions.)

Then running:

```
brew upgrade vrecord
```

(This downloads the latest release of vrecord and the latest releases of any other packages it depends on.)

Alternatively, you can run:

```
brew upgrade
```

(This command will upgrade all of the programs you've installed through Homebrew.)

Note: brew update, brew upgrade, brew upgrade vrecord, and brew cleanup can be useful if you are having an error when running vrecord.

Click “Installing vrecord”

https://github.com/amiaopensource/vrecord/blob/master/Resources/Documentation/installation_and_setup.md#installing-vrecord

3. Install DV Analyzer

Direct download: <https://mediaarea.net/DVAnalyzer>

4. Install DVRescue

Go to <https://github.com/mipops/dvrescue>

Direct download: <https://mediaarea.net/DVRescue>

OR

Install DVRescue with Homebrew in Terminal

Homebrew

The latest stable releases of DVRescue and associated tools can also be downloaded via [Homebrew](#), a package manager for Mac (or Linux), using the following commands:

```
brew tap mediaarea/homebrew-mediaarea
brew install dvrescue
```

This Homebrew formula will install the following tools: `dvloupe dvmap dvpackager dvplay dvrescue dvsampler`.

5. Setup Equipment

See Wiring Diagram (Pg. 14)

Connect the 4-pin FireWire/IEEE-1394 cable end to the DV jack of the Sony DCR-PC100 MiniDV Camcorder

Connect the 9-pin FireWire/IEEE-1394 cable end to FireWire 800 port of the MacBook Pro

Turn on the camcorder and set the camcorder to VTR mode

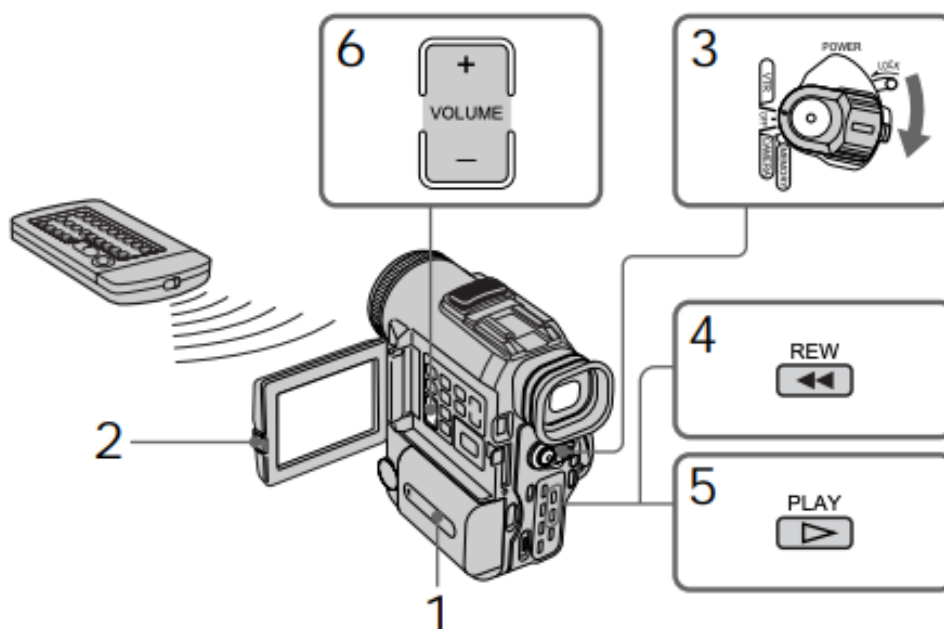
REWIND the tape

At this point it is recommended to have the camcorder plugged in to an outlet otherwise the camcorder could turn off during the transfer if the battery runs out causing an unnecessary interruption in capture.

Playing back a tape

You can monitor the playback picture on the LCD screen. If you close the LCD panel, you can monitor the playback picture in the viewfinder. You can control playback using the Remote Commander supplied with your camcorder.

- (1) Install the power source and insert the recorded tape.
- (2) Press OPEN to open the LCD panel.
- (3) Set the POWER switch to VTR while pressing the small green button. The video control buttons light up.
- (4) Press ◀◀ to rewind the tape.
- (5) Press ▶▶ to start playback.
- (6) To adjust the volume, press either of the two buttons on VOLUME.



To stop playback
Press ■.

Pg. 25 of the Sony DCR-PC100 MiniDV Camcorder Manual.

6. Run vrecord

Setting up vrecord for the First Time

In macOS, open System Preferences and click on the icon for Blackmagic Design. If you do not see this icon in System Preferences you may not have installed the Blackmagic driver.

Open up the Blackmagic Design preferences and click on the "Settings" tab. Select your input and output from the dropdown menu depending on what cables you have connected to the capture device.

Once your capture device is set up you can start vrecord by simply opening up a [Terminal window](#) and typing

```
vrecord
```

The first time you use vrecord you will be asked to make some initial choices about how you want to capture. Any decisions you make will be saved in a configuration file. But don't worry, you will be able to alter these decisions later. Vrecord will ask you for video and audio inputs. These should agree with your settings for the Blackmagic capture device. Vrecord's other settings can be tailored to your liking. See the section on [Options for Video Capture](#) which explains all of the settings in detail.

Basic Usage

For those who want the simplest possible explanation on how to use vrecord:

1. Run `vrecord -p`.
2. Choose the appropriate options when prompted.
3. Play your tape in the connected VTR and set up to color bars and audio on the tape (if possible).
4. Close the vrecord window to end passthrough mode.
5. Now run `vrecord -e` and make sure all options are correct in vrecord's GUI window.
6. Type in a unique identifier for your video file when prompted.
7. Press "enter" to start recording.
8. Let 'er rip! Play your tape!
9. Let vrecord do its thing. Don't type any keys while the vrecord window is open, do not click the mouse inside the vrecord window, and do not start another instance of vrecord on the same computer. In fact it's best not to open or use any other programs on the computer that is capturing. Overtaxing the computer could cause errors in the capture.
10. If you are finished recording and the vrecord window hasn't already closed, close the window.
11. Check the Terminal window for any error messages. Hopefully you don't see any cows. (See [Ending a Capture](#) below for more details)
12. Check to make sure that your video and metadata files were successfully created.
13. Repeat steps 1–12 as needed.

7. Configure vrecord

- If connected to a standalone DV deck
- If connected to FireWire/IEEE-1394 cable go to step 8

Set file recording options.

Input Options

Decklink: DV Audio Config

Decklink input options

Select Input Utility: ffmpeg

Select Video Card: [Empty]

Select Video Input: Composite

Select Audio Input: Analog

Select Audio Channel Mapping: 2 Stereo Tracks (Channels 1 & 2 -> 1st Track Stereo, 1 Stereo Track (From Channels 1 & 2), 1 Stereo Track (From Channels 3 & 4), Channel 1 -> 1st Track Mono, Channel 2 -> 2nd Track Mono, Channel 1 -> 1st Track Mono, Channel 2 -> 2nd Track Mono, Channel 1 -> Single Track Mono, Channel 2 -> Single Track Mono)

Select Standard: NTSC

Select Video Bit Depth: 10 bit

Select timecode format: none

☐ Invert Second Channel of Audio (WARNING: Do not use this option unless required)

Output file options

Embed digitization logs in video file (Matroska ONLY): Yes

Select File Format: QuickTime

FFV1 Slice Count: 4

Select Video Codec: Uncompressed Video

Select Audio Codec: 24-bit PCM

Playback options

Select View (for recording): Unfiltered

Select View (for passthrough): Unfiltered

Sidecar file options

frameMD5s? (recommended): Yes

QCTools XML?: Yes, after recording

RS422 deck control

Status: disabled

Timecode: [Empty]

Deck Control: [Buttons: Play, Stop, Eject]

Select a recording directory: /Users/dig/Desktop/DV

Select a directory for auxiliary files (leave blank to match the recording directory): [Empty]

Recording event options

Name of Recording: [Empty]

Enter the name of the person digitizing this tape: [Empty]

Set recording time (integer or decimal) in minutes: [Empty]

File naming options

Enter an optional file prefix: [Empty]

Enter an optional file suffix: [Empty]

☐ Check this to turn off appending of suffixes

Output Filename: /Users/dig/Desktop/DV.mov

Errors & Warnings: [Empty]

[Record] [Passthrough] [Save Settings] [Home] [Cancel] [Refresh]

8. Capture MiniDV tape with vrecord

Click the 'DV' tab

Select a recording directory

Create a file name

Press Record

Set file recording options.

Input Options
 Decklink ☒ DV ☐ Audio ☐ Config ☐
 DVRescue avcctl input options

Select a DV Device

DV deck control

Status
 disabled

Deck Control Repack ⏮ ⏭ ⏭ ⏮

Select a recording directory
 /Users/dig/Desktop/DV

Select a directory for auxiliary files (leave blank to match the recording directory).

Recording event options
 Name of Recording Enter the name of the person digitizing this tape Set recording time (integer or decimal) in minutes

File naming options
 Enter an optional file prefix Enter an optional file suffix ☐ Check this to turn off appending of suffixes

Output Filename: /Users/dig/Desktop/DV.dv

Errors & Warnings:

Record Passthrough Save Settings Home Cancel Refresh

9. DV Analyzer

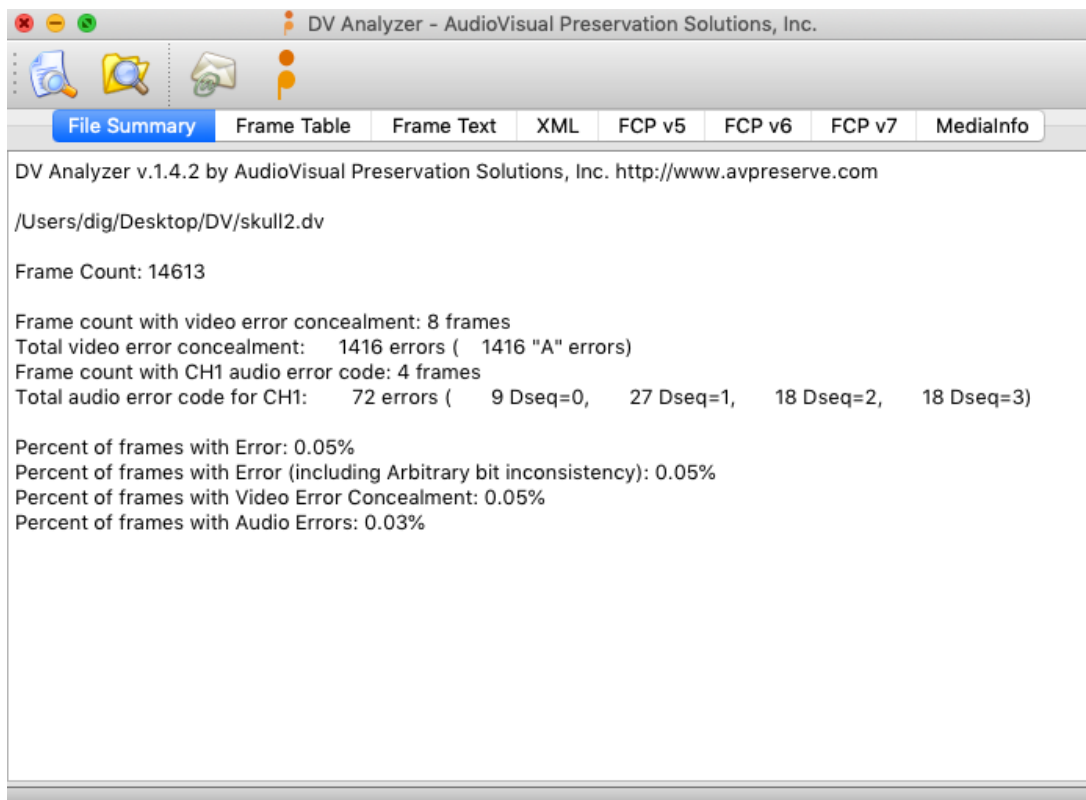
<https://mediaarea.net/DVAnalyzer/what-does-it-analyze>

Via terminal: dvanalyzer "file path"

OR

Open and run the GUI

https://mediaarea.net/DVAnalyzer/Download/Mac_OS



10. Run DVRescue's tools

<https://github.com/mipops/dvrescue>

How to use

DVRescue

`dvrescue` can be run on the command line by calling the program and passing in a filepath, like so:

```
dvrescue path/to/my/video.dv
```

Additional tools

Within this repository are additional tools used to supplement DVRescue. For demonstrations on how to use the command line tools, please see the AMIA 2020 presentation video [here](#) and related blog posts [here](#).

They are:

dvloupe A script that reports on a single frame with color coding and related data.

dvmap A script that makes the arrays used in dvloupe. (Not very useful on its own)

dvpackager A script that rewraps one DV stream into two MOV files. Used for splitting DV files when the significant characteristics change.

dvplay A script that plays back and visualizes the DV errors as a stack of images. Running with the `-x` flag will produce JPEGs instead of just playing them. Requires FFplay.

dvrescue.xsd This file can be used to validate a DVRescue XML output. It also contains definitions of the DVRescue parameters.

dvsampler A script that downloads or creates DV files to use as samples. Requires FFmpeg.

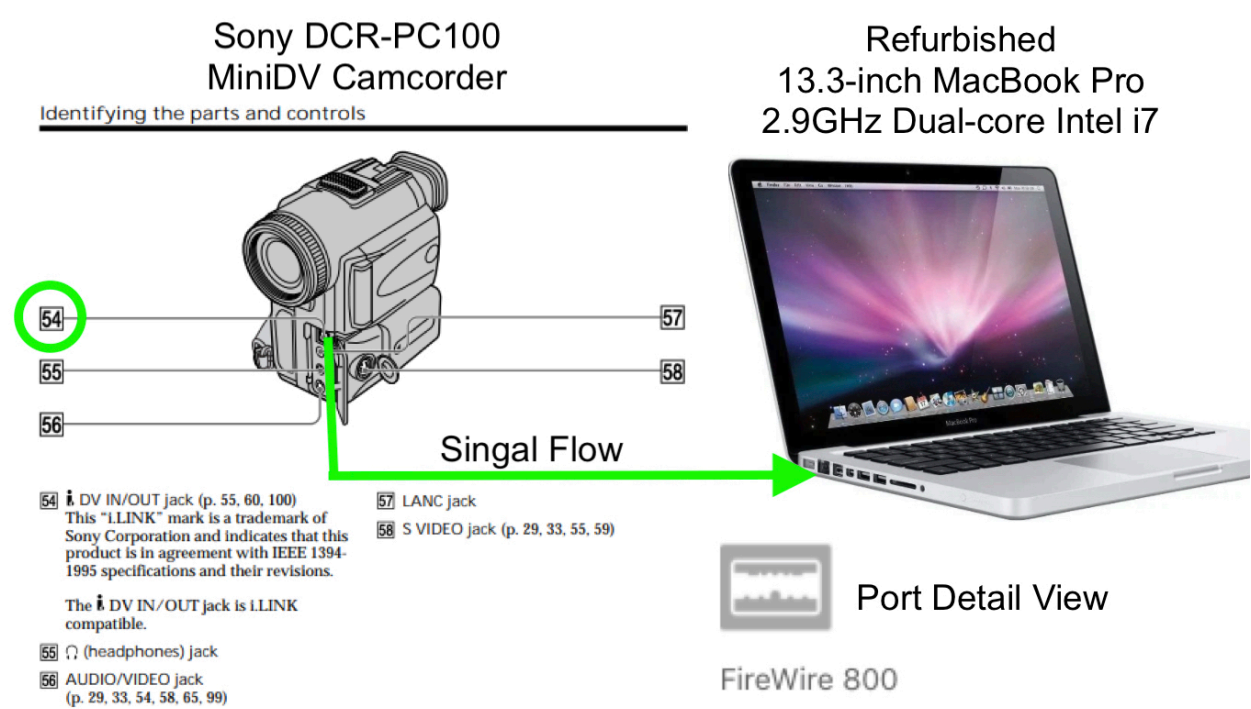
dvmerge A script that takes multiple transfers of the same tape containing errors and combines them to create one file with the best information available for each problematic frame. `dvmerge` is part of `dvrescue`. See `dvrescue -h` on a recent build.

dvguidance A collection of additional resources including documentation, video demonstrations, and solutions for how the operator may improve the transfer as guided by DVRescue. `dvguidance` resources can be found [here](#).

Suggested tools

- `dvplay` (as note above adding `-x` to `dvplay` in terminal creates helpful JPEGs of errors)
- `dvpackager`
- `dvmerge` (`dvrescue FILE1 FILE2 FILE3 ... --merge OUT.dv`)

Wiring Diagram



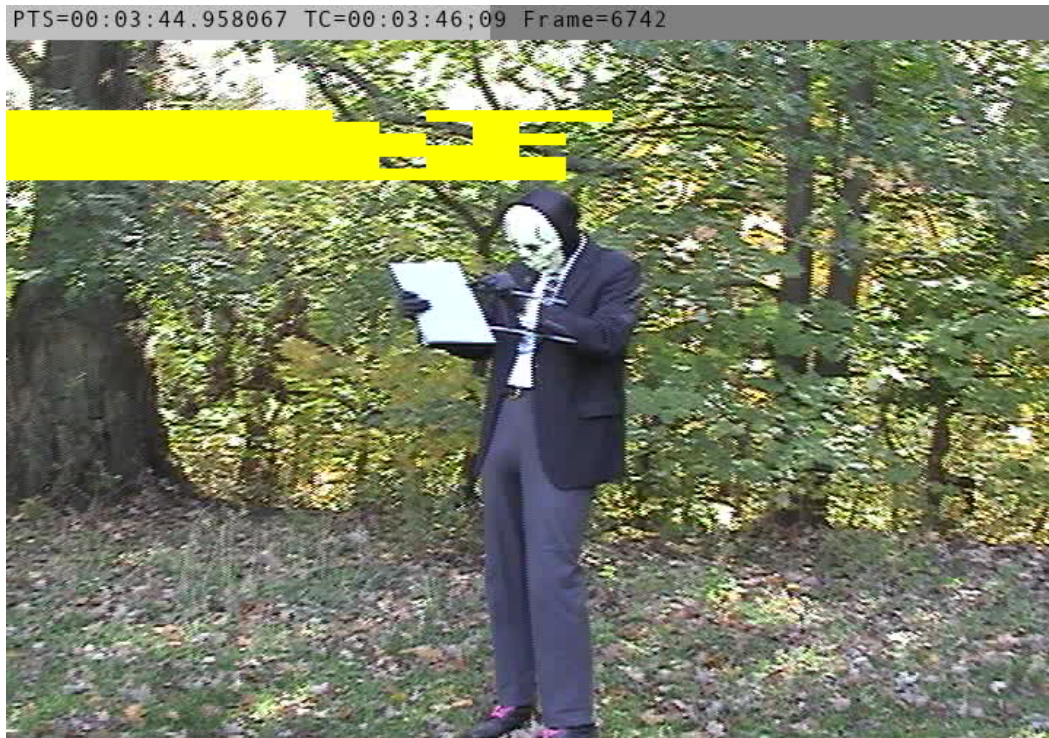
Pg. 135 of the Sony DCR-PC100 MiniDV Camcorder Manual.



Transmission Type: DV

Connector Type:
IEEE-1394 / FireWire
Also referred to as i.LINK (SONY)

Appendix



Examples of JPEGs with errors generated from using dvplay -x



Screengrab generated while running dvplay

Works Cited

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